In [58]:
```
#ElasticNet
import pandas as pd
import warnings
warnings.filterwarnings("ignore")
```

In [59]:
```
data=pd.read_csv("/home/placement/Downloads/fiat500.csv")
```

In [60]:
```
data.describe()
```

Out[60]:

| | ID | engine_power | age_in_days | km | previous_owners | lat | lon | price |
|---|---|---|---|---|---|---|---|---|
| **count** | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 | 1538.000000 |
| **mean** | 769.500000 | 51.904421 | 1650.980494 | 53396.011704 | 1.123537 | 43.541361 | 11.563428 | 8576.003901 |
| **std** | 444.126671 | 3.988023 | 1289.522278 | 40046.830723 | 0.416423 | 2.133518 | 2.328190 | 1939.958641 |
| **min** | 1.000000 | 51.000000 | 366.000000 | 1232.000000 | 1.000000 | 36.855839 | 7.245400 | 2500.000000 |
| **25%** | 385.250000 | 51.000000 | 670.000000 | 20006.250000 | 1.000000 | 41.802990 | 9.505090 | 7122.500000 |
| **50%** | 769.500000 | 51.000000 | 1035.000000 | 39031.000000 | 1.000000 | 44.394096 | 11.869260 | 9000.000000 |
| **75%** | 1153.750000 | 51.000000 | 2616.000000 | 79667.750000 | 1.000000 | 45.467960 | 12.769040 | 10000.000000 |
| **max** | 1538.000000 | 77.000000 | 4658.000000 | 235000.000000 | 4.000000 | 46.795612 | 18.365520 | 11100.000000 |

In [61]:
```
data.head()
```

Out[61]:

| | ID | model | engine_power | age_in_days | km | previous_owners | lat | lon | price |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | lounge | 51 | 882 | 25000 | 1 | 44.907242 | 8.611560 | 8900 |
| **1** | 2 | pop | 51 | 1186 | 32500 | 1 | 45.666359 | 12.241890 | 8800 |
| **2** | 3 | sport | 74 | 4658 | 142228 | 1 | 45.503300 | 11.417840 | 4200 |
| **3** | 4 | lounge | 51 | 2739 | 160000 | 1 | 40.633171 | 17.634609 | 6000 |
| **4** | 5 | pop | 73 | 3074 | 106880 | 1 | 41.903221 | 12.495650 | 5700 |

In [62]:
```
data1=data.loc[(data.previous_owners)==1]
```

In [63]:
```
data1
```

Out[63]:

| | ID | model | engine_power | age_in_days | km | previous_owners | lat | lon | price |
|---|---|---|---|---|---|---|---|---|---|
| **0** | 1 | lounge | 51 | 882 | 25000 | 1 | 44.907242 | 8.611560 | 8900 |
| **1** | 2 | pop | 51 | 1186 | 32500 | 1 | 45.666359 | 12.241890 | 8800 |
| **2** | 3 | sport | 74 | 4658 | 142228 | 1 | 45.503300 | 11.417840 | 4200 |
| **3** | 4 | lounge | 51 | 2739 | 160000 | 1 | 40.633171 | 17.634609 | 6000 |
| **4** | 5 | pop | 73 | 3074 | 106880 | 1 | 41.903221 | 12.495650 | 5700 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **1533** | 1534 | sport | 51 | 3712 | 115280 | 1 | 45.069679 | 7.704920 | 5200 |
| **1534** | 1535 | lounge | 74 | 3835 | 112000 | 1 | 45.845692 | 8.666870 | 4600 |
| **1535** | 1536 | pop | 51 | 2223 | 60457 | 1 | 45.481541 | 9.413480 | 7500 |
| **1536** | 1537 | lounge | 51 | 2557 | 80750 | 1 | 45.000702 | 7.682270 | 5990 |
| **1537** | 1538 | pop | 51 | 1766 | 54276 | 1 | 40.323410 | 17.568270 | 7900 |

1389 rows × 9 columns

In [64]:
```
data2=data1.drop(['lat','lon','ID'],axis=1)
```

In [65]:
```
data2
```

Out[65]:

| | model | engine_power | age_in_days | km | previous_owners | price |
|---|---|---|---|---|---|---|
| **0** | lounge | 51 | 882 | 25000 | 1 | 8900 |
| **1** | pop | 51 | 1186 | 32500 | 1 | 8800 |
| **2** | sport | 74 | 4658 | 142228 | 1 | 4200 |
| **3** | lounge | 51 | 2739 | 160000 | 1 | 6000 |
| **4** | pop | 73 | 3074 | 106880 | 1 | 5700 |
| **...** | ... | ... | ... | ... | ... | ... |
| **1533** | sport | 51 | 3712 | 115280 | 1 | 5200 |
| **1534** | lounge | 74 | 3835 | 112000 | 1 | 4600 |
| **1535** | pop | 51 | 2223 | 60457 | 1 | 7500 |
| **1536** | lounge | 51 | 2557 | 80750 | 1 | 5990 |
| **1537** | pop | 51 | 1766 | 54276 | 1 | 7900 |

1389 rows × 6 columns

In [66]:
```
data2=pd.get_dummies(data2)
```

In [67]:
```
data2
```

Out[67]:

| | engine_power | age_in_days | km | previous_owners | price | model_lounge | model_pop | model_sport |
|---|---|---|---|---|---|---|---|---|
| **0** | 51 | 882 | 25000 | 1 | 8900 | 1 | 0 | 0 |
| **1** | 51 | 1186 | 32500 | 1 | 8800 | 0 | 1 | 0 |
| **2** | 74 | 4658 | 142228 | 1 | 4200 | 0 | 0 | 1 |
| **3** | 51 | 2739 | 160000 | 1 | 6000 | 1 | 0 | 0 |
| **4** | 73 | 3074 | 106880 | 1 | 5700 | 0 | 1 | 0 |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **1533** | 51 | 3712 | 115280 | 1 | 5200 | 0 | 0 | 1 |
| **1534** | 74 | 3835 | 112000 | 1 | 4600 | 1 | 0 | 0 |
| **1535** | 51 | 2223 | 60457 | 1 | 7500 | 0 | 1 | 0 |
| **1536** | 51 | 2557 | 80750 | 1 | 5990 | 1 | 0 | 0 |
| **1537** | 51 | 1766 | 54276 | 1 | 7900 | 0 | 1 | 0 |

1389 rows × 8 columns

In [68]:
```
y=data2['price']
x=data2.drop('price',axis=1)
```

In [69]:
```
y
```

Out[69]:
```
0       8900
1       8800
2       4200
3       6000
4       5700
        ...
1533    5200
1534    4600
1535    7500
1536    5990
1537    7900
Name: price, Length: 1389, dtype: int64
```

In [90]:
```
from sklearn.model_selection import train_test_split
x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.33,random_state=42)
```

In [91]:
```
x_test.head(5)
```

Out[91]:

| | engine_power | age_in_days | km | previous_owners | model_lounge | model_pop | model_sport |
|---|---|---|---|---|---|---|---|
| **625** | 51 | 3347 | 148000 | 1 | 1 | 0 | 0 |
| **187** | 51 | 4322 | 117000 | 1 | 1 | 0 | 0 |
| **279** | 51 | 4322 | 120000 | 1 | 0 | 1 | 0 |
| **734** | 51 | 974 | 12500 | 1 | 0 | 1 | 0 |
| **315** | 51 | 1096 | 37000 | 1 | 1 | 0 | 0 |

In [92]:
```
y_train
```

Out[92]:
```
915     10900
12       9700
638     10850
190      9990
701     10300
        ...
1201     8300
1239     3950
1432     8900
951      6500
1235     8800
Name: price, Length: 930, dtype: int64
```

In [93]:
```
from sklearn.linear_model import ElasticNet
from sklearn.model_selection import GridSearchCV

elastic = ElasticNet()

parameters = {'alpha': [1e-15, 1e-10, 1e-8, 1e-4, 1e-3,1e-2, 1, 5, 10, 20]}

elastic_regressor = GridSearchCV(elastic, parameters)

elastic_regressor.fit(x_train, y_train)
```

Out[93]:
```
GridSearchCV(estimator=ElasticNet(),
             param_grid={'alpha': [1e-15, 1e-10, 1e-08, 0.0001, 0.001, 0.01, 1,
                                   5, 10, 20]})
```

**In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.**
**On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.**

In [94]:
```
elastic_regressor.best_params_
```

Out[94]:
```
{'alpha': 0.01}
```

In [95]:
```
elastic=ElasticNet(alpha=.01)
elastic.fit(x_train,y_train)
y_pred_elastic=elastic.predict(x_test)
```

In [96]:
```
from sklearn.metrics import r2_score
r2_score(y_test,y_pred_elastic)
```

Out[96]:
```
0.8602162350730707
```

In [97]:
```
from sklearn.metrics import mean_squared_error
elastic_Error=mean_squared_error(y_pred_elastic,y_test)
elastic_Error
```

Out[97]:
```
515349.9787871871
```

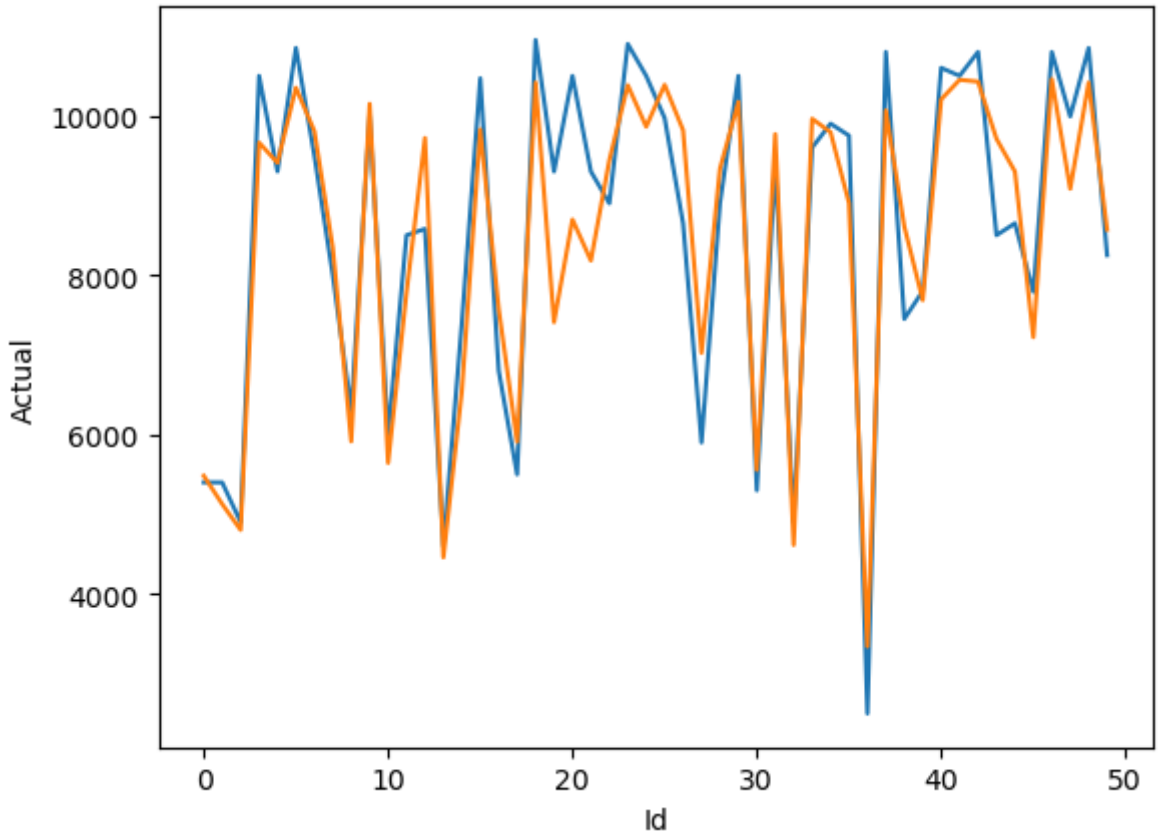
In [99]:
```
Results=pd.DataFrame(columns=['Actual','Predicted'])
Results['Actual']=y_test
Results['Predicted']=y_pred_elastic
Results=Results.reset_index()
Results['Id']=Results.index
Results.head(15)
```

Out[99]:

| | index | Actual | Predicted | Id |
|---|---|---|---|---|
| **0** | 625 | 5400 | 5482.171479 | 0 |
| **1** | 187 | 5399 | 5127.531740 | 1 |
| **2** | 279 | 4900 | 4803.203231 | 2 |
| **3** | 734 | 10500 | 9662.825235 | 3 |
| **4** | 315 | 9300 | 9408.645424 | 4 |
| **5** | 652 | 10850 | 10350.952605 | 5 |
| **6** | 1472 | 9500 | 9806.127960 | 6 |
| **7** | 619 | 7999 | 8341.142824 | 7 |
| **8** | 992 | 6300 | 5913.786719 | 8 |
| **9** | 1154 | 10000 | 10149.093829 | 9 |
| **10** | 757 | 6000 | 5643.649619 | 10 |
| **11** | 1299 | 8500 | 7780.541311 | 11 |
| **12** | 400 | 8580 | 9720.293317 | 12 |
| **13** | 314 | 4600 | 4459.155236 | 13 |
| **14** | 72 | 7400 | 6541.667411 | 14 |

In [100]:
```
import seaborn as sns
import matplotlib.pyplot as plt
sns.lineplot(x='Id',y='Actual',data=Results.head(50))
sns.lineplot(x='Id',y='Predicted',data=Results.head(50))
plt.plot()
```

Out[100]: []



In [ ]: